

What is claimed is:

1. A method for producing a continuous aqueous solution of chlorine dioxide comprising the steps of:
 - 5 a. obtaining an aqueous alkali metal or alkaline earth metal chlorite solution having up to about 35 wt % of the alkali metal or alkaline earth metal chlorite,
 - b. with water, diluting the aqueous alkali metal or alkaline earth metal chlorite to form a continuous feed stream having a
10 chlorite concentration of between about 0.001 wt % and about 0.25 wt %,
 - c. irradiating the continuous feed stream in a reacting vessel with ultraviolet light radiation, and
 - d. producing a continuous aqueous product stream containing
15 between about 0.0005 wt % and about 0.05 wt % chlorine dioxide.
2. The method of claim 1, wherein the aqueous alkali metal or alkaline earth metal chlorite is sodium chlorite.
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3. The method of claim 1, wherein the continuous feed stream is irradiated in a reacting vessel with ultraviolet radiation having primary wavelengths of 254 nm.
- 25 4. The method of claim 1, wherein the continuous feed stream reacts in the presence of the ultraviolet radiation to form primarily chlorine dioxide, chloride and chlorate.
- 30 5. The method of claim 1, wherein the continuous feed stream contains between about 0.00052 pound of chlorite to about 0.0034 pound of chlorite for each watt-hr of ultraviolet radiation applied.

6. The method of claim 1, wherein the chlorite in the continuous feed stream is converted by 20 wt % to 43 wt % to chlorine dioxide.
- 5 7. The method of claim 4, wherein the chlorite in the continuous feed stream reacts preferentially to form chlorine dioxide and chloride in approximately equal molar quantities.
8. The method of claim 1, wherein the product stream has a pH in the alkaline range.
- 10 9. The method of claim 1, wherein the product stream has a pH between 9.0 and 9.7.
10. The method of claim 1, wherein the product stream has a pH less than 10.
- 15 11. A device for producing an aqueous solution of chlorine dioxide comprising:
 - a. a continuous feed system comprising:
 - 20 b. a source of an aqueous alkali metal or alkaline earth metal chlorite solution having a concentration of up to about 35 wt %, and
 - c. means for diluting with water the alkali metal or alkaline earth metal chlorite solution to produce a continuous feed stream having a chlorite concentration of between about 0.001 wt %
 - 25 and about 0.25 wt %
 - d. a reacting vessel in fluid communication with the feed system comprising:
 - at least one ultraviolet lamp located in the reacting vessel,
 - 30 and
 - a distributor plate located in the reacting vessel.

12. The device of claim 11, wherein the feed system adds chlorite to a water stream by either pumping the chlorite or educting the chlorite into the water stream.
- 5 13. The device of claim 11, wherein the at least one ultraviolet lamp is enclosed in at least one quartz or fluoropolymer plastic tube.
- 10 14. The device of claim 13, wherein the at least one quartz or fluoropolymer plastic tube extends through an end of the reacting vessel allowing access for an electrical supply to the at least one ultraviolet lamp.
- 15 15. The device of claim 11, wherein the reacting vessel has a connection where the feed stream enters the reacting vessel and a connection wherein a product stream exits the reaction vessel.
- 20 16. The device of claim 15, wherein the reacting vessel has at least one quartz or fluoropolymer plastic tube that protrudes through the distributor plate located near the connection where the feed stream enters.
- 25 17. The device of claim 16, wherein the distributor plate is designed to provide a balanced flow of the feed stream past the at least one quartz or fluoropolymer plastic tubes containing the ultraviolet lamps.
- 30 18. The device of claim 11, wherein the continuous feed stream flowing through the reaction vessel provides cooling for the at least one ultraviolet lamp maintaining a temperature below about 120 °F.
19. The device of claim 13, wherein the maximum distance from a quartz or fluoropolymer plastic tube outward perpendicular to the quartz or

fluoropolymer plastic tube to the nearest object is less than about 0.75 inches.

- 5 20. The device of claim 11, wherein the reacting vessel is irradiated with
 between 150 and 200 ultraviolet watts of radiation continuously over a
 24 hour period in producing one pound of chlorine dioxide.
- 10 21. The device of claim 11, wherein the reacting vessel requires no gas for
 stripping the chlorine dioxide from the feed solution and transporting it
 to another solution.
22. The device of claim 11, wherein the reacting vessel has no internal
 circulation tubes.
- 15 23. The device of claim 11, wherein the reacting vessel produces a
 continuous product stream of aqueous chlorine dioxide.
24. A continuous aqueous chlorine dioxide product stream produced by the
 process comprising the steps of:
- 20 a. obtaining an aqueous alkali metal or alkaline earth metal
 chlorite solution having up to about 35 wt % of the alkali metal
 or alkaline earth metal chlorite,
- b. with water, diluting the aqueous alkali metal or alkaline earth
 metal chlorite to form a continuous feed stream having a
25 chlorite concentration of between about 0.001 wt % and about
 0.25 wt %,
- c. irradiating the continuous feed stream in a reacting vessel with
 ultraviolet light radiation, and
- d. producing a continuous aqueous product stream containing
30 between about 0.0005 wt % and about 0.05 wt % chlorine
 dioxide.

25. The product of claim 24, wherein the diluting step is accomplished with the use of an eductor motivated by the water.
- 5 26. The product of claim 24, wherein the diluting step is accomplished by use of a pump.
27. The product of claim 24, wherein the flow rate of the feed stream is controlled by use of a valve.
- 10 28. The product of claim 24, wherein the feed stream is distributed uniformly through a distributor plate.
29. The product of claim 28, wherein the uniformly distributed feed stream is irradiated with ultraviolet radiation.
- 15 30. The product of claim 24, wherein the aqueous chlorine dioxide is produced on a continuous basis at a rate of up to 5 pounds per day.